

## REMARKS

Non-elected method claims 25-28 have been canceled, and new dependent claims 29 and 30 have been added. No new matter was added. Accordingly, claims 1, 2, 11-24, 29 and 30 are pending. Applicant submits arguments for overcoming the rejections based on the prior art of record and respectfully submits that the present application is in condition for allowance.

### **I. Restriction Requirement**

*In the Office Action, the Examiner requires restriction between claims 1, 2 and 11-24 (Group I) directed to a sputtering target and claims 25-28 (Group II) directed to a method of making a sputtering target.*

Applicant confirms the election of claims 1, 2 and 11-24 (Group I) for prosecution in the present application and has canceled non-elected method claims 25-28.

### **II. Objection to Specification**

*In the Office Action, the Examiner objects to a typographical error on page 3 of the application as filed.*

Applicant has amended and corrected the typographical error on page 3, line 22, of the present application by replacing the incorrect abbreviation of nickel with "Ni". This is the only change and no new matter was added. Accordingly, Applicant requests removal of this objection.

### **III. Claim Objection**

*In the Office Action, the Examiner objects to a formality with respect to the use of the term “residual”.*

Claims 1 and 2 of the present application have each been amended to replace the phrase “and residual” with the phrase “with the balance being” as suggested by the Examiner. No new matter was added.

In addition, claims 1 and 2 of the present application have each been amended to replace the word “containing” with the phrase “consisting essentially of”. This phrase is deemed more appropriate since the claims are clearly limited to a two component alloy include a specified amount of Ta with the balance being Ni. Accordingly, it would not be proper to interpret claims 1 and 2 as containing any meaningful amount of Fe.

Still further, new claims 29 and 30 have been added and require that the content of Fe in the sputtering target is no greater than 1 wtppm. No new matter was added. See page 6, lines 9-10, of the present application, as filed, which states that the “analytical values of this representative high purity nickel target are shown in Table 1.” Also, see Table 1 on page 7 of the present application, as filed, which lists the content of the element Fe in the target as 1 wtppm.

Accordingly, Applicant respectfully requests removal of the claim objection, appropriate interpretation of the claim limitations, and approval of the new claims.

#### **IV. Claim Rejections – 35 USC §103(a)**

- A. *In the Office Action, claims 1 and 2 are rejected under 35 USC §103(a) as being obvious over JP 62-040363 A of Suzuki et al.*

In response to the above referenced rejection and in consideration of the claim amendments made herein, Applicants respectfully submit that:

- (i) an adequate rationale sufficient to support the legal conclusion of obviousness has not been provided with respect to why it would be obvious for one of ordinary skill in the art to modify the PERMALLOY sputtering target of Suzuki et al.;
- (ii) the PERMALLOY sputtering target of Suzuki et al. teaches away from the sputtering target of the present invention as now claimed; and
- (iii) modifying the PERMALLOY sputtering target of Suzuki et al. as required to make the rejection, considering the claim amendments made herein, would destroy the intended function of the PERMALLOY sputtering target of Suzuki et al..

Accordingly, for these reasons which are discussed in greater detail below, Applicant respectfully requests reconsideration and removal of the rejection of claims 1 and 2.

##### **(i) No Adequate Rationale for Modifying Suzuki et al.**

The U.S. Board of Patent Appeals has consistently held that rejections on obviousness grounds cannot be sustained by mere conclusory statements. Instead, there must be articulate reasoning with rational underpinning to support the legal conclusion of obviousness.

Applicants respectfully submit that a proper prima facie case of obviousness cannot be made under 35 USC §103(a) with Suzuki et al. because an adequate rationale has not been articulated for modifying the PERMALLOY sputtering target of Suzuki et al. in a manner required to attain the sputtering target of the present invention as now claimed. Further, one of

ordinary skill in the art using common sense at the time of the invention would not have reasonably looked to the teaching of Suzuki et al. (which is limited to a PERMALLOY sputtering target) in connection with producing a sputtering target as now claimed in the present application.

Turning first to the present invention, it relates to a “high-purity” nickel-titanium alloy sputtering target. As disclosed for instance in Table 1 on page 7 of the present application, as filed, the content of Fe in the sputtering target was no more than 1wtppm. Further, as now claimed, the target is required to “consist essentially of” a specified amount of Ta with the balance being Ni. These are the only meaning components of the alloy and target, and the intention is that the alloy is of “high purity”.

The present invention addresses the following problem. As a gate electrode material, a metal film mainly of Ni is formed on a Si substrate, and this is subject to heat treatment to form a NiSi (silicide) film. However, an NiSi film can readily make a phase transition to NiSi<sub>2</sub>, and there is a problem of the boundary roughness becoming aggravated and highly resistive. Moreover, there are other problems in that NiSi<sub>2</sub> is easily coagulated and excessive formation of silicides occur.

Accordingly, the primary objective of the present invention is to form a thermally stable NiSi film. This is accomplished according to the present invention by adding a prescribed amount of Ta to a high purity Ni sputtering target and ultimately forming an NiSi film that easily makes a phase transition to NiSi<sub>2</sub> and that raises the phase change temperature from NiSi to NiSi<sub>2</sub>. Thus, by adding the specified amount of Ta to the high purity Ni, the sputtering target of the present invention can be used to produce thin films that inhibit excessive reaction between Ni and Si in a silicide film thereby improving thermal stability of the silicide film.

In contrast, the components and structure of the alloy in the sputtering target of Suzuki et al. are entirely different and their intended function and purpose are entirely different from that of the present invention.

Suzuki et al. disclose a sputtering target for use in forming a soft magnetic thin film. The Sputtering target is made of a PERMALLOY material, which consists of specified percentages of Ni and Fe. For example, the Ni-Fe alloy sputtering target includes 10 to 50at% of Fe which is required to form a soft magnetic thin film desired by Suzuki et al.. Further, a specified percentage of other elements is added to the PERMALLOY material, such as 4.9at% Nb and 2.1at% Si.

Of primary importance to Suzuki et al., the chemical reaction between oxygen in the sputtering atmosphere and the Fe component of the PERMALLOY material must be prevented. Accordingly, Suzuki et al. teach addition to the PERMALLOY material of other elements that have a greater affinity with oxygen so that a more stable soft magnetic film can be formed in comparison with those formed from conventional PERMALLOY and Mo PERMALLOY materials.

Accordingly, the primary components of the sputtering targets of the present invention and that of Suzuki et al. are clearly different. Suzuki et al. require a significant amount of Fe whereas claims 1 and 2 of the present application require no meaningful amount of Fe. Thus, any modification of the sputtering target of Suzuki et al., such as “substituting Nb with Ta” as suggested in the Office Action, does not provide the sputtering target required by the claims of the present application.

Further, one of skill in the art following the teachings of Suzuki et al. would add Nb to a PERMALLOY material only for purposes of preventing chemical reaction between oxygen

present in the sputtering atmosphere and the Fe of the PERMALLOY material. Therefore, since the sputtering target of the present invention does not contain any meaningful amount of Fe, there would be no reason for one of skill in the art to add Nb or another element having a greater affinity with oxygen.

Accordingly, Applicant respectfully submits that the reasoning stated in the Office Action with respect to substituting Nb with Ta is a mere conclusory statement that is insufficient to support the legal conclusion of obviousness. One of ordinary skill in the art would have no reason for providing the sputtering target required by the claims of the present application. The presence of a significant amount of Fe is clearly required by Suzuki et al., and the addition of the additional element is for purpose of preventing chemical reaction between oxygen and the Fe.

For at least these reasons, Applicant respectfully request reconsideration and removal of the obviousness rejection of the claims, as amended, of the present application.

(ii) Suzuki et al. Teaches Away from the Present Invention

As discussed above, the sputtering target of Suzuki et al. is made of PERMALLOY, which is an alloy consisting of specified percentages of Ni and Fe. The sputtering target of Suzuki et al. also includes other elements, such as Nb, added to the PERMALLOY material for purposes of preventing chemical reaction of Fe from the target with oxygen in the sputtering atmosphere.

Accordingly, Suzuki et al. clearly teach the necessity of the presence of a meaningful amount of Fe needed to produce soft magnetic thin films.

“Teaching away” is the antithesis of the art suggesting that the person of ordinary skill in the art go in the claimed direction. Essentially, “teaching away” is a per se demonstration of lack of obviousness. In re Fine, 873 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

It is clear that Suzuki et al. teach away from a sputtering target not including a meaning amount of Fe, for example, 10 to 50at% of Fe.

Claims 1 and 2, as amended, of the present application require the sputtering target to consist essentially of Ta and Ni. Thus, a meaningful amount of Fe is not present. New claims 29 and 30 reflect the insignificant presence of Fe content as disclosed in Table 1 on page 7 of the present application. Accordingly, one of ordinary skill in the art is taught away from the present invention by Suzuki et al.; because, Suzuki et al. requires a significant amount of Fe.

For at least these additional reasons, Applicant respectfully requests reconsideration and removal of the obviousness rejection of the claims, as amended, of the present application.

(iii) Modifying Suzuki et al. would Destroy its Intent, Purpose or Function

When a §103 rejection is based upon a modification of a reference that destroys the intent, purpose or function of the invention disclosed in the reference, such a proposed modification is not proper and a *prima facie* case of obviousness cannot be properly made. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984).

The intent, purpose and function of Suzuki et al. is to provide a PERMALLOY sputtering target for forming a soft magnetic thin film. In addition, the intent, purpose and function of Suzuki et al. is to provide a PERMALLOY sputtering target that prevents oxygen in a sputtering atmosphere from reacting with Fe of the target.

Eliminating Fe from the PERMALLOY sputtering target of Suzuki would clearly destroy its intent, purpose and function with respect to being able to form a soft magnetic thin film. Further, the elimination of Fe would destroy the intent, purpose and function of the additional element added to the PERMALLOY material which is present solely for the purpose of preventing oxygen from chemically reacting with Fe of the target.

For at least these additional reasons, Applicant respectfully requests reconsideration and removal of the obviousness rejection of the claims, as amended, of the present application.

Accordingly, Applicant respectfully submits that claims 1 and 2 of the present application are non-obvious and patentable over the Suzuki et al. reference.

*B. In the Office Action, claims 11-14 and 18-21 are rejected under 35 USC §103(a) as being obvious over JP 62-040363 A of Suzuki et al. in view of U.S. Patent No. 6,485,542 B2 of Shindo et al.*

Similar to Suzuki et al., the Shindo et al. reference discloses a Ni-Fe sputtering target for forming magnetic thin films. Thus, the presence of Fe is clearly required.

Accordingly, for the identical reasons stated above in great detail with respect to claims 1 and 2 being non-obvious and patentable over Suzuki et al., Applicant respectfully submits that claims 11-14 and 18-21 are non-obvious and patentable over Suzuki et al. in view of Shindo et al.. See arguments provided above.

Accordingly, Applicant respectfully requests reconsideration and removal of the rejection based on the combination of Suzuki et al. and Shindo et al..



C. *In the Office Action, claims 15-17 are rejected under 35 USC §103(a) as being obvious over JP 62-040363 A of Suzuki et al. in view of the IEE publication of Herser.*

Similar to Suzuki et al., the Herser publication requires a significant amount of Fe. More specifically Fe is the primary component of Herser, and Ni is not even present. See numerous locations on page 1397 of the Herser publication which is solely directed to a study of the composition:  $\text{Fe}_{74.5-x}\text{Cu}_x\text{Nb}_3\text{Si}_{13.5}\text{B}_9$  ( $x=0, 1$  at%).

Accordingly, for the identical reasons stated above in great detail with respect to claims 1 and 2 being non-obvious and patentable over Suzuki et al., Applicant respectfully submits that claims 15-17 are non-obvious and patentable over Suzuki et al. in view of Herser. See arguments provided above.

Accordingly, Applicant respectfully requests reconsideration and removal of the rejection based on the combination of Suzuki et al. and Herser.

D. *In the Office Action, claims 22-24 are rejected under 35 USC §103(a) as being obvious over JP 62-040363 A of Suzuki et al. in view of U.S. Patent No. 6,485,542 B2 of Shindo et al. and further in view of the IEE publication of Herser.*

Suzuki et al., Shindo et al., and Herser have all been discussed above in detail. All require significant amounts of Fe. All teach away from eliminating Fe, and the purpose, intent and function of each would be destroyed by eliminating Fe. The claims of the present invention, of course, require no significant amount of Fe in the sputtering target.

Accordingly, for the identical reasons stated above in great detail with respect to claims 1 and 2 being non-obvious and patentable over Suzuki et al., Applicant respectfully submits that claims 22-24 are non-obvious and patentable over Suzuki et al. in view of Shindo et al. and further in view of Herser. See arguments provided above.

Accordingly, Applicant respectfully requests reconsideration and removal of the rejection based on the combination of Suzuki et al., Shindo et al. and Herser.

#### **V. Conclusion**

In view of the amendments and above remarks, Applicant respectfully submits that the rejections have been overcome and that the present application is in condition for allowance. Thus, a favorable action on the merits is therefore requested.

Please charge any deficiency or credit any overpayment for entering this Amendment to our deposit account no. 08-3040.

Respectfully submitted,  
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